

### **REMARKS**

By the above amendment, claims 1 and 2 have been amended to clarify features of the present invention with claim 2 being amended to be in dependent form. Additionally, claims 3, 7 and 8 have been amended with claims 7 and 8 being amended to utilize the term "supply" rather than "send", which terminology is considered more appropriate.

Turning to the rejection of claims 1-3, 7 and 8 under 35 U.S.C. 103(a) as being unpatentable over Otsubo et al (Japanese Patent Publication 11-260596) in view of Gesche et al (U.S. 5,140,223) and Tobe et al (U.S. 5,891,349), such rejection is traversed insofar as it is applicable to the present claims, and reconsideration and withdrawal of the rejection are respectfully requested.

As to the requirements to support a rejection under 35 U.S.C. 103, reference is made to the decision of In re Fine, 5 USPQ 2d 1596 (Fed. Cir. 1988), wherein the court pointed out that the PTO has the burden under §103 to establish a prima facie case of obviousness and can satisfy this burden only by showing some objective teaching in the prior art or that knowledge generally available to one of ordinary skill in the art would lead that individual to combine the relevant teachings of the references. As noted by the court, whether a particular combination might be "obvious to try" is not a legitimate test of patentability and obviousness cannot be established by combining the teachings of the prior art to produce the claimed invention, absent some teaching or suggestion supporting the combination. As further noted by the court, one cannot use hindsight reconstruction to pick and choose among isolated disclosures in the prior art to deprecate the claimed invention.

Furthermore, such requirements have been clarified in the recent decision of In re Lee, 61 USPQ 2d 1430 (Fed. Cir. 2002) wherein the court in reversing an obviousness rejection indicated that deficiencies of the cited references cannot be

remedied with conclusions about what is "basic knowledge" or "common knowledge".

The court pointed out:

The Examiner's conclusory statements that "the demonstration mode is just a programmable feature which can be used in many different device[s] for providing automatic introduction by adding the proper programming software" and that "another motivation would be that the automatic demonstration mode is user friendly and it functions as a tutorial" do not adequately address the issue of motivation to combine. This factual question of motivation is immaterial to patentability, and could not be resolved on subjected belief and unknown authority. It is improper, in determining whether a person of ordinary skill would have been led to this combination of references, simply to "[use] that which the inventor taught against its teacher."... Thus, the Board must not only assure that the requisite findings are made, based on evidence of record, but must also explain the reasoning by which the findings are deemed to support the agency's conclusion. (emphasis added)

Before discussing the cited art, applicants note that claim 1 has been amended to more clearly set forth the features of the present invention as illustrated in Fig. 1 of the drawings, for example. More particularly, claim 1 has been amended to recite the feature that the plasma processing apparatus further comprises a first capacitatively coupled plasma generating means and a second electromagnetic wave radiation plasma generating means. As illustrated in Fig. 1 and as described at pages 17-21 of the specification, in the arrangement shown in Fig. 1, a high-frequency power is supplied to mutually isolated conductors 2a and 2b disposed opposite a stage electrode 3 and forming an opposed electrode with respect thereto, with the high-frequency power being supplied from the high-frequency power supply 9 through a matching box 10, whereby a capacitatively coupled plasma discharge is generated between the stage electrode 3 and the isolated conductors 2a and 2b of the opposed electrode. During such plasma discharge, a high-frequency current flows in the midst of the plasma which is generated among the conductors and the

stage electrode so as to maintain the plasma discharge and the matching box 10 serves to take an output impedance matching between a high-frequency power supply 9 and the plasma as generated in order to dispense with power reflection so as to continue supplying the power for the plasma discharge. Such features are now recited in claim 1 in the recitation that the first capacitatively coupled plasma generating means is arranged so that a capacitatively coupled plasma discharge is generated between the opposed electrode and the stage electrode.

Furthermore, in accordance with the present invention as recited in claim 1, there is provided a second electromagnetic wave radiation plasma generating means as illustrated in Fig. 1 and described at pages 21-24 of the specification, for example. As described, an electromagnetic wave is radiated from the insulators 4a and 4b disposed between the upper conductors 2a and 2b of the opposed electrode and a wall portion 1a of the process chamber. In accordance with the present invention, electron cyclotron resonance (ECR) occurs at a magnetic field formed between the coils 14, which allows an energy to be supplied to the electrons contained in the plasma with high efficiency so as to maintain the plasma discharge. A radio frequency displacement current flows between the insulators 4a and 4b disposed between the respective conductors 2a and 2b and a wall of the plasma process chamber 1a and in response to the displacement current by way of the insulators in the manner described. Applicants note that a first current flowing through the insulator 4a is controlled by a potential difference between the earth potential of the process chamber and the voltage applied from the matching box 10, which first current is kept constant, whereas a second current flowing through the insulator 4b is controlled by a high-frequency current flowing through an LC resonant circuit composed at least of a variable capacitor 11, a pair of coils 12a and 12b representing an inductor as well as a capacitor formed by the insulator 4b, for example. The resonance of the LC resonant circuit is controlled by means of the

variable capacitor 11 so that the high-frequency current is controlled so as to control the electromagnetic wave radiation. As recited in claim 1, the second plasma generating means comprises insulators disposed between a plasma process chamber and the plurality of conductors, respectively, and the second plasma generating means is arranged so that an electromagnetic wave is radiated from at least a position between the plurality of isolated conductors which are connected to the matching box by at least one of an inductor L and a capacitor C and the plasma process chamber forming a resonant circuit including at least one of the LC, and a resonance of the resonant circuit including the at least one of the L and the C is controlled.

As described at page 9, lines 12-16 of the specification, in accordance with the present invention, uniformity of the plasma distribution is obtained by controlling the distribution of the radiated electromagnetic wave power and the control of the power applied to the plasma in the plasma in the capacitatively coupled state. It is noted that Figs. 3-6 provide examples for achieving control and claim 1 has been amended to recite the features of enhanced plasma distribution controllability. Applicants submit that such features as now recited in claim 1 are not disclosed or taught in the cited art.

Turning first to Otsubo et al, noting that the present inventor of this application is the first named inventor of this reference, assuming arguendo that the conductors 71a and 71b as contended by the Examiner represent a plurality of mutually isolated conductors oppositely disposed with respect to a stage electrode, it is not seen that Otsubo discloses means to supply high-frequency power to the opposed electrode through a matching box with the capacitatively coupled generating means being arranged so that a capacitatively coupled plasma discharge is generated between the opposed electrode and the stage electrode. Furthermore, assuming arguendo that insulating materials 80a, 80b, 80c as contended by the Examiner represent

insulators disposed between the plasma process chamber and the plurality of conductors, respectively, it is not seen that Otsubo et al discloses or teaches that an electromagnetic wave is radiated from at least a position between the plurality of isolated conductors which are connected to the matching box by supply of current through at least one of an inductor L and a capacitor C and the plasma process chamber forming a resonant circuit including at least one of the L and C so as to generate plasma discharge in the plasma process chamber, nor that a resonance of the resonant circuit including the at least one of the L and C is controlled. Contrary to the position set forth by the Examiner, Otsubo et al does not disclose or teach the recited features of claim 1, as amended. The Examiner recognizes that "Otsubo et al fails to teach a radio frequency displacement control means forming a LC circuit" and that "Otsubo et al fails to specifically teach an electromagnetic wave power control means including a distribution controller connected to a matching box and a high-frequency power supply". The Examiner contends that such features are taught by Gesche et al and Tobe et al, and that it would be obvious to modify Otsubo et al to provide the same. Applicants submit that the Examiner has engaged in a hindsight reconstruction attempt utilizing the principle of "obvious to try" which is not the standard of 35 U.S.C. 103 and applicants submit that such combination is contrary to the disclosure of Otsubo et al.

Turning to Gesche et al, while Gesche et al may be considered to disclose a capacity coupled plasma generating means having a matching box, applicants note that the plasma distribution controllability solely by means of a capacity coupled discharge is poor, such that it is difficult to uniformly generate the plasma discharge with respect to the sample. Further, high-density plasma is not generated due to the fact that the accelerated level of electrons flowing in the plasma is downgraded. Applicants submit that according to the disclosure of Gesche et al, plasma discharge is maintained with a high-frequency current flowing in the plasma generated between

the electrodes 4 and 7 and Gesche et al provides no disclosure or teaching of a second electromagnetic wave radiation plasma generating means comprising insulators disposed between at least a portion of the plasma process chamber and the plurality of isolated conductors, respectively, with the second plasma generating means being arranged so that an electromagnetic wave is radiated from at least a position between the plurality of isolated conductors which are connected to the matching box by supply of current through at least one of an inductor L and a capacitor C and the plasma generating chamber forming a resonant circuit including at least one of the L and C so as to generate plasma discharge in the plasma process chamber with a resonance of the resonant circuit including at least one of the L and C being controlled as part of the electromagnetic wave radiation plasma generating means. Applicants submit that there is no disclosure or teaching in Gesche et al of electromagnetic wave radiation as recited in claim 1, which contributes to the generation of plasma discharge which is combined with the capacitatively coupled plasma generating means so as to enhance plasma distribution controllability as obtained by the present invention. Furthermore, applicants note that any modification of Otsubo et al by Gesche et al represents a hindsight reconstruction attempt since it is apparent that Otsubo et al which was filed in 1998 had the disclosure of Gesche et al which issued in 1992 available at the time of the making of the invention of Otsubo et al, and as is apparent from the disclosure of Otsubo et al did not utilize the same. Thus, applicants submit that claim 1 and the dependent claims patentably distinguish over this proposed combination of references.

As to the further combination with Tobe et al, hereagain, this patent also does not disclose a plasma processing apparatus utilizing a first capacitatively coupled plasma generating means and a second electromagnetic wave radiation plasma generating means as defined. Applicants submit that irrespective of the position set

forth by the Examiner, Tobe et al does not disclose or teach the structural arrangement as recited including formation of a LC resonant circuit and control in the manner defined. As such, applicants submit that claim 1 and the dependent claims patentably distinguish over this proposed combination of references in the sense of 35 U.S.C. 103 and should be considered allowable thereover.

Applicants note that irrespective of the position set forth by the Examiner, none of the references taken alone or in combination provide a teaching of the recited features with the Examiner attempting to take bits and pieces from the prior art in order to reconstruct applicants' invention, which is not proper and which does not result in the claimed features as recited.

With respect to the dependent claims, applicants note that claim 2 recites the feature that the second electromagnetic wave radiation plasma generating means is arranged so that the plasma discharge is generated under an ECR condition controlled by a magnetic field formed by coils and the electromagnetic wave is radiated. Claim 3 recites the feature of means to store a processing procedure to control distribution during plasma processing and a distribution controller controls the plasma distribution during plasma processing according to the processing procedure stored in the store means. Applicants submit that while the Examiner contends that it is obvious to modify Otsubo et al to provide such features based upon the disclosure of Tobe et al, applicants submit that Tobe et al and Gesche et al do not provide such features and cannot be properly combined with Otsubo et al to provide the same. See In re Lee, supra. Additionally, claims 7 and 8 recite features concerning supply of RF current to the substrate and other features which when combined with the features of parent claims further distinguish over the art, irrespective of the Examiner's position. Thus, applicants submit that the dependent claims further patentably distinguish over the cited art and should be considered allowable thereover.

In view of the above amendments and remarks, applicants submit that all claims present in this application should now be in condition for allowance, and issuance of an action of a favorable nature is courteously solicited.

To the extent necessary, applicant's petition for an extension of time under 37 CFR 1.136. Please charge any shortage in the fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account No. 01-2135 (520.39737X00) and please credit any excess fees to such deposit account.

Respectfully submitted,



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